

## ROYAL BOTANIC GARDENS, KEW.

## BULLETIN

OF

## MISCELLANEOUS INFORMATION.

No. 9]

[1916

## XL.—BRAZIL-WOOD.

J. H. HOLLAND.

The Brazil-wood of the xivth-xvth century was obtained from the East—India, Malaya, Ceylon, &c., and the tree producing it may therefore be properly attributed to *Caesalpinia Sappan*, the only dye-wood that would seem to fit the earlier descriptions. But it cannot be taken as conclusive that this was the only "brazil" of the period, since Marco Polo, who travelled in the East about 1260, in his description of Lambri\* remarks, "They have plenty of camphor and of all sorts of other spices; they have also 'brazil' in great quantities. This they sow, and when it is grown to the size of a small shoot they take it up and transplant it; then they let it grow for three years, after which they tear it up by the root. You must know that Messer Marco Polo aforesaid brought some seed of the 'brazil,' such as they sow, to Venice with him, and had it sown there, but never a thing came up, and I fancy it was because the climate was too cold." This description suggests *Morinda citrifolia*, a red-dye plant known as "Al," grown under similar conditions in India to this day, though the cultivation is almost if not entirely abandoned as an industry, since the introduction of aniline dyes. It is a small tree that may be treated as a biennial or triennial as above recorded.† That the same traveller had some knowledge of another "brazil" is clear when he says, "When you leave the island of Java (the less) and the kingdom of Lambri, you sail north about 150 miles and then you come to two islands, one of which is called Necuveran (Nicobars of the present day).‡ . . . Their woods are all of noble and valuable kinds of trees, such as 'Red Sanders' and 'Indian-nut' and 'Cloves' and 'Brazil,' and sundry other good spices."§ Again, according to Yule,|| the Brazil wood of Kaulam (Malabar) appears in the Commercial Handbook of Pegolotti (circa 1340) as "Verzino

\* Yule (1871), Travels of Marco Polo, ii. p. 241. Lambri is believed to be N.W. of Sumatra.

† *Ventilago maderaspatana*, Gaertn. and *Oldenlandia umbellata*, Linn., both roots yielding a red dye may perhaps also be suggested.

‡ Yule, l.c. p. 249.

§ l.c. p. 248. || l.c. p. 315.

colombino," and he further details kinds of Brazil as "Verzino salvatico," "Verzino dimestico," and "Verzino colombino." "Red Sanders Wood" (*Pterocarpus santalinus*)\* as a possible source of the Eastern "brazil," is disposed of by the fact that it does not yield any colour to water, though the close general resemblance appears to be sufficient to have permitted an occasional swindle. It is related by Garcia da Orta (1490-1570) in his "Colloquies on the Simples and Drugs of India"† when asked, "How do you know that this red kind is 'sandal' and not 'brazil,' for neither of them has scent?" replied, "It is true that neither has a good scent, but the 'brazil' is softer and more dyed. It was in this way that a friend of mine, a merchant, was a loser, for he bought red sandal for brazil, and the dyers found that it gave no dye and he found no sale for it."

It does not seem possible to say exactly when the wood of *Caesalpinia Sappan* lost its identity, as "brazil" (brésil, French; Verzino, Italian; Lignum brasile or brasyle, &c., &c.), nor yet the period when it became better known in this country by its Malay name of "Sappan." Under the former name it was certainly an important article of commerce in the middle ages. Flückiger and Hanbury,‡ quoting from "Tarif des Péages," or "Customs Tariff" of the Counts of Provence in the middle of the 13th century, mentions "brazil-wood" amongst other imports from the East. Most dictionary articles quote Marco Polo for brazil, and Chaucer (1340-1400)§ is early enough with "brasile" to mean the same wood. One hundred years or so later (May 3rd, 1500), Brazil was discovered, and the country received this name because of the large quantities of a red-dye wood found growing there. It seems probable that this wood, being of superior quality, superseded that of *Caesalpinia Sappan*. In its turn the Brazilian wood has been replaced to a large extent by "Cam-

\* *Pterocarpus santalinus* does in fact yield a red-dye, but unlike the brazil woods it does not yield colour to water but requires alcohol or ether to extract it. The watery solution of a few chips shows a strong fluorescence somewhat like that of "Lignum Nephriticum" (*Eysenhardtia amorphoides*; see *Kew Bull.*, 1909, p. 203). A "Note on the Colouring matter of Red Sanders Wood," by Dr. P. Bolley, is given in the *Pharm. Journ.*, Series i. Vol. vii. (1847), p. 288. It may be concluded that the method of extracting the dye was not known in the ancient times referred to above; the more modern ages show an important trade in it as a dye-wood, but at the present time it is apparently of no value, especially since the introduction of synthetic dyes. The red colour is due to Santalin and not to Brasilin as in the Brazil woods. Watt (*Comm. Prod. India*) states that the dye is still used in India for marking idols and for staining the forehead in certain caste markings. It may, however, be pointed out that the "Red Sanders" alluded to by Marco Polo cannot well be *Pterocarpus santalinus*, which is confined to Southern India. Marco Polo refers to two islands, one of which is Neuveran, a name probably covering the whole of the Nicobar group. His second island may therefore be taken as meaning the Andaman group. There is no tree in the Nicobars which resembles *P. santalinus*, but in the Andamans there is a species *Pterocarpus dalbergioides* confined as a wild tree to this group which has a red timber known in the trade as "Andaman Red wood." (See Prain, *Indian Forester*, XXVI. No. 10, Oct., 1900, Report on the Indian species of *Pterocarpus*, pp. 1-16.)

† Markham, *Transl.* (London, 1913), pp. 393-395.

‡ *Pharmacographia*, p. 635.

§ *Encycl. Dict.*, Cassell & Co., i. p. 769.



wood" (*Baphia nitida*)\* from West Africa. Thomson† states that "within the last ten years Brazil wood has been nearly superseded by a wood imported from Africa, to which our dyers give the name of 'camwood.' It is richer and gives a finer colour than any of the varieties of brazil wood." The relative position of "sappan wood," "brazil wood" and "camwood" in 1787-1834, was approximately as follows:—In 1787 the duty was £33 per cent. for sappan and camwood, while brazil was duty free, in 1819 the duty for sappan and brazil wood was £20 per cent. and for camwood 15s. per ton. In 1834 the price on the London Market for sappan wood was from £8 to £14 per ton, with a duty of 1s. per ton, for brazil wood from £60 to £80 per ton, exclusive of the duty of £2 per ton, and for camwood £16 to £18 per ton, inclusive of a duty of 5s. a ton. At this period (1834), of sappan wood, it was stated that "very little is now imported"; of brazil wood, the imports "inconsiderable," and of camwood "there were imported 475 tons in 1828 and 119 tons in 1829."‡ The exports of brazil wood from Bahia in 1878 were 821 kilos, almost entirely to the United States.§

At the present time "camwood" is the only one of the three above-mentioned products that is quoted on the markets, a recent Liverpool report showing it as valued at £12 15s. 0d. per ton. Brazil wood for medicinal purposes was quoted in 1879 at 1s. 6d. per lb., but in this connection as well as for dyeing purposes it is now neglected, and recent enquiries at several large establishments in London show that the product is scarcely known.

There are unfortunately no herbarium specimens showing any association with the name "brazil," and accordingly the literature though extensive—consisting more often than not of mere notes—has to be almost entirely relied upon to separate the different woods. The following eight trees seem the more probable sources of brazil wood, all having been called, amongst other names, "brazil," or "braziletto," by various authors. An outline of the pod of each is given.

**Caesalpinia Sappan**, *Linn. Sp. Pl.* (1753), p. 381. A small thorny tree; flowers yellow; pod 3-4 in. long by 1½ in. thick, compressed, smooth, with a hard cuspidate or recurved beak at the end, containing 2 to 4 brown seeds.

The "brazil-wood" of early times (before 1500), usually known at the present day as "sappan-wood"; also known as "bakam-wood," "red-wood," etc. *Bresillet des Indes* of Lamarck, *Encycl. Method. i.* (1783), p. 462. Native of the Malay Peninsula and Malay Archipelago.

The dark heart-wood was formerly largely used in this country, and to some extent may still be used; but its use is now more common in the countries of production. It is probably the oldest dye-wood known, having been in use for some 700 years. In addition to the references by Marco Polo and Garcia d'Orta,

\* Particulars of this dye-wood tree are given in *Kew Bull. Add. Series ix.* 2 (1911), pp. 246-247. See also *Kew Bull.* 1906, pp. 373-375.

† Chemistry of Organic Bodies—Vegetables (London, 1838), p. 410.

‡ McCulloch, *Dict. Commerce* (London, 1834).

§ *Spon's Encycl.* (1881), p. 856.

an early trade is recorded with India and Batavia in letters by the Officers of the Factories of the East India Company in 1638—"the *Blessing* would be dispatched to Surat within five days, carrying calicoes, saltpetre, 'sappan-wood,'"\* and "from Battavia for this place three ships commanded by Vanderbrooke were dispeeded," two of which, viz., second and third ship arrived the 30th of October, and having landed here "sapon-wood, sandall, nutmeggs, elephant's teeth."† It will be noted in these letters that the name "brazil" is not used, nor does it occur in Foster's works from 1618.

Some particulars of the present day trade in this wood, with references to literature, etc., are given in *Kew Bulletin*, Add. Series IX. part 2, 1911, p. 252.

**Caesalpinia echinata**, *Lam. Encycl. Method.* i. (1783), p. 461.

A large tree with reddish and thorny bark; leaflets ovate-obtuse; flowers yellow and red, fragrant; pods about 3 in. long 1 in. broad, prickly, containing two flat, brown seeds.

*Pseudo santalum rubrum* f. *arbor Brasilia* (Bauhin, 1623; Plukenet, 1696). "Ibira-pitanga" or "ymira-piranga"; *Lignum rubrum* of Brazil (Marcgravi de Liebstad, 1648; Guilielmi Pisonis, 1658; Martius, 1870-76). "Brazil Wood" (of the period after 1500; Pomet, 1694; Barham, 1794); "Fernambouc," "Fernambuc," or "Pernambuco" Wood; "Bois de Bresil," "Bresillet de Fernambouc" (Lamarck, 1783); "Pao de Rainha," or "Queen's Wood" (Holtzapffel, 1852).

According to Pomet, as early as 1694-1725 this wood was regarded as the best of the Brazil woods, of which he says, "We sell to the dyers several sorts of redwoods by the name of Brazil. The first that is most esteemed and most in use is the Brazil wood called Farnambuck, because it is brought from a place of that name in Brazil."‡ He concludes his enumeration of five sorts as follows:—"Likewise that which makes so many different kinds of 'Brasil-wood' is nothing else but the several places and difference of the soil where the wood grows," and "As to the 'Brasil chips' the best account I can give you of it is to trust to the honesty of the merchant with whom you deal."§

Barham|| states that "the true Brazil is called Pernambuco wood, being the place from whence they come in Brazil, the Brazilians calling it "Ibirapitanga. . ." This wood is used among the dyers, and the stationers make red ink of it." Lunan¶ 20 years later, quotes Barham; but in the course of another 20 years or so this wood seems to have been losing its importance as according to Thomson,\*\* it was being superseded from about 1828 by "camwood" from West Africa. At the Exposition

\* William Fremlin at Gombroon to the Company, Jan. 13th, 1638; Foster, *The English Factories in India, 1637-1641* p. 40.

† President Fremlin and others at Surat to the Company, Dec., 1639; Foster, l.c. p. 218.

‡ Pomet's figure of the tree, however—*Hist. Gen. des Drogues*, iii. Paris, 1694, p. 119; English edition, London, 1725, p. 53, t. 24, appears to be more or less fanciful and does not correctly portray any Brazil Wood tree then known.

§ l.c. Eng. ed. p. 68.

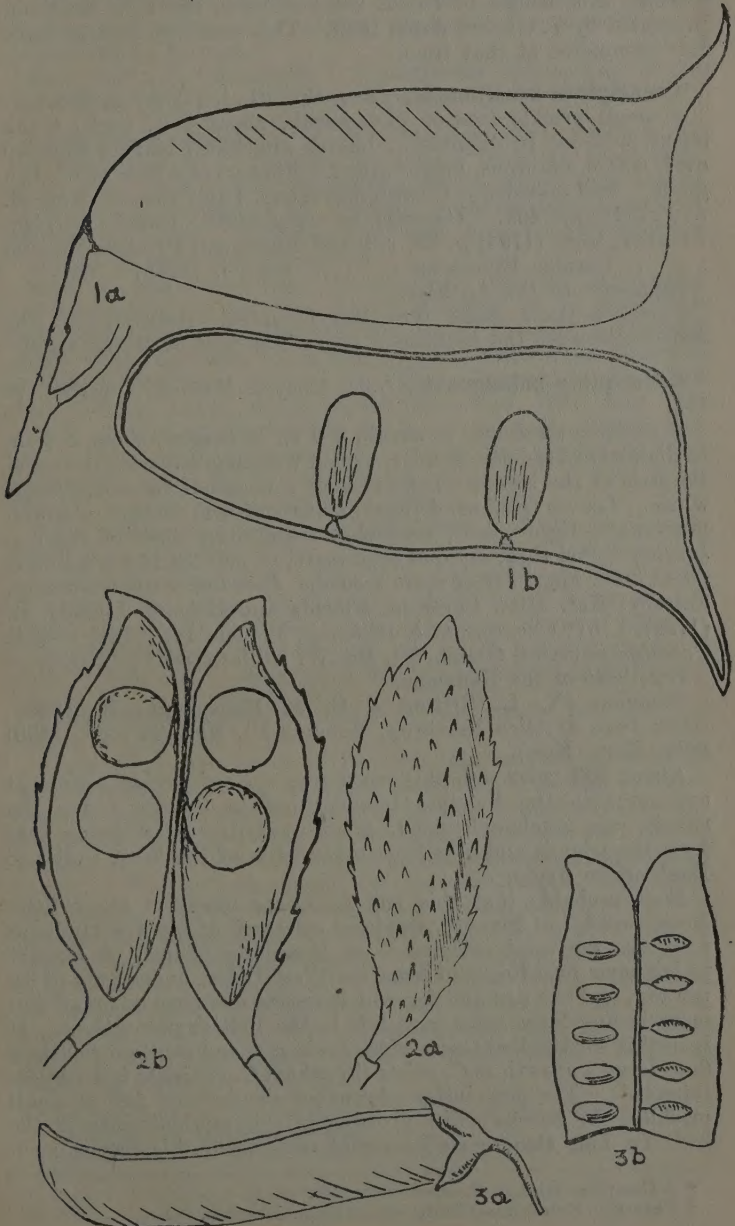
|| *Hortus Americanus* (1794), p. 23.

¶ *Hortus Jamaicensis*, i. (1814), p. 111.

\*\* *Chemistry of Organic Bodies—Vegetables* (1838), p. 410.



Universelle de Bruxelles, 1910, in a pamphlet published by the Commission d'Expansion Economique du Brésil: "Exploitation des Bois," it was stated that "Pao Brazil," "Ibirapitanga," ou "Arabutan" (*Caesalpinia echinata*), which was formerly



1. *Caesalpinia Sappan*; 2. *C. echinata*; 3. *C. brasiliensis*.

exported in large quantities to Europe for dyeing is to day almost abandoned for this purpose; the wood is used for constructional work, railway sleepers, etc.; the density is recorded as 1.185.

There is a sample of Brazil wood chips in the Kew Museum, presented by J. Glover, dated 1849. This would be such as came into commerce at that time.

**Caesalpinia brasiliensis**, Linn. Sp. Pl. i. (1753) p. 380.

A small prickly tree or undershrub, about 4 ft. high; trunk about 8-12 in. in diameter. Leaves alternate; leaflets rounded oval, entire, glabrous, bright green. Flowers of a pale or whitish green. Pod 5-seeded. *Caesalpinia crista*, Lam. Encycl. Method. i. (1783) p. 462. *Caesalpinia polyphylla aculeis horrida*, Plumier, Gen. (1793) p. 28, t. 9 and Burmann, Pl. Americanum . . . Carolus Plumerius . . . etc.; i. (1755) t. 68.

Brasileto of the Antilles.

Lamarck (l.c.) states that this is called Brésillet in the Antilles because the heartwood is red like that of Brazil wood.

**Caesalpinia bahamensis**, Lam. Encycl. Method. i. (1783), p. 461.

A medium sized tree or shrub, 8-9 ft. in height; stems 2-3 in. in diameter; branches slender, armed with small black prickles at the base of the leaves. Inflorescence a terminal raceme; flowers white. Leaves (pinnae) 4-jugal; leaflets of firm texture, obovate-mucronate, light green, somewhat resembling those of *Haematoxylon*. Pod thin, oblique acuminate, or pointed like a scimitar about 3 in. long, 5-7 or more seeded. *Pseudosantalum croceum*, Catesby, Nat. Hist. Carolina, Florida and Bahama Islands, ii. (1754), t. 51; *Caesalpinia brasiliensis*, Plenck, Ic. (1791) t. 324; *Caesalpinia crista*, Griseb. Fl. Br. W. Indies (1864) p. 205.

Brasileto of the Bahamas.

Bahamas (N. L. Britton & C. F. Millspaugh, No. 2883, 1905; John & Alice Northrop, Bahama Pl. No. 426 (coll. 1890) 1899, Herb. Kew).

About 200 years ago this wood was a considerable article of commerce in the Bahama Islands; but in Catesby's day the supply was much exhausted, great quantities of it being sent from the islands and also from other parts of the West Indies to England for dyeing.

It is probable that this and *C. crista* represent the "little Brazil wood" of Pomet\*, the least esteemed of his five kinds, as may also the wood referred to as Brasileto (Nattali & Bond)† which came into England from the West Indies under duty of 3s. per ton, and the demand for which was at one time so great that scarcely any large trees were left in the British plantations. It is in this work called *Caesalpinia vesicaria*, and said not to attain to so large a growth as *C. crista* (by which *C. echinata* is doubtless intended). The description—branches slender and full of small prickles; the flowers white growing in a pyramidal spike at the end of a long slender stalk—would seem to fit this species as it

\* A Compleat Hist. of Drugs (1725), p. 68.

† Vegetable Substances: Materials of Manufacture, p. 361.

is the only one of the series under consideration with white flowers.

Grisard & Van den Berghe\* would infer this species in the statement "Quant aux bois de 'Bahama' également† utilise en teinture, mais n'ont aucune importance commerciale et industrielle en Europe."

The wood of "Braziletto" (*Caesalpinia bahamensis*) is recorded‡ as being imported from New Providence in 1857.

**Caesalpinia bicolor**, *C. H. Wright, Kew Bull.*, 1896, p. 22.

A small tree 15–20 ft. high, branching from the base; stems up to 3 in. in diameter, branches scantily armed with thorns. Leaves bipinnate with 8–12 alternate ovate-emarginate leaflets. Flowers red-purple. Pod flat, 2 in. long, 1 in. wide, 5-seeded.

Native of Peru and Colombia.

Said to yield a very fine "Brazil-wood" the dye from which was ascertained by the late Daniel Hanbury to be superior to that yielded by the best Pernambuco Brazil wood.§ A specimen of the wood, however, forwarded by Mr. White from Colombia to Kew in 1897 was examined by Prof. Hummel at the Yorkshire College, Leeds, who reported (Nov. 2nd, 1897) that "the sample of wood of *Caesalpinia bicolor* received for examination has so little colouring power that it may be regarded as of no commercial value."|| A note on this wood as "A New Brazil Wood" is given in *Kew Bulletin*, 1896, p. 223.

On a writing received at the same time as a sample of seeds, 1896¶ it is recorded, "This is ink made from *C. bicolor*. It may change colour as I notice it has already on the packet of seeds. The reason is that any alkali turns it purple and lessens the stability of the colour, which is almost a carmine. I have, however, writing 28 years old which has kept its colour well." This note is dated 10/6/96, and the colour is still good.

**Peltophorum brasiliense** (*Sw.*), *Urban, Symb. Ant. Fl. Ind. Occid. ii.* (1900–01) p. 285.

A spreading tree up to 15 ft. high (Macfadyen) up to 80 ft. with a trunk 4 ft. in diameter (Harris); branches unarmed. Leaves bipinnate; pinnae 4-paired; leaflets 7–8-paired, sub-opposite, oval obtuse at the apex, 1–1½ in. long. Inflorescence a raceme, axillary or paniculate at the ends of the branches; flowers small, yellow. Pod flat, chartaceous or leaf-like, 2½ in. long, about 1 in. broad; seeds 4, compressed ovoid. *Pseudosantalum croceum*, Sloane, *Nat. Hist. Jamaica*, ii. (1725) p. 184, t. 231, ff. 3, 4; *Caesalpinia brasiliensis*, Linn. *Sp. Pl.* i. (1753) p. 380, (in part); *C. brasiliensis*, Sw. *Obs.* (1791) p. 166; *C. brasiliensis*, Macfadyen, *Fl. Jamaica* (1837) p. 328; *Peltophorum Linnaei*, Benth. in Hook. *Journ. Bot.* ii. (1840) p. 75; *P. Linnaei*, Griseb. *Fl. B. W. Indies* (1864) p. 206; *Caesalpinia cubensis*, Greene, *Trans. Acad. St. Louis*. vii. (1897) p. 416 t. 32.

\* Les Bois Industr. Indig. et Exot. in Bull. Soc. d'Accl., 1894, p. 323.

† Referring here to Nicaragua wood.

‡ Redwood, Suppl. Pharmacopœia (London, 1857), p. 267.

§ White, Specimen No. 11, 1895, in Herb. Kew.

|| Note with specimen of the wood in Museum, Kew.

¶ White, Palmira, Colombia, specimen in Museum, Kew.



Braziletto of Jamaica (Sloane, Bröwne, Macfadyen).

Jamaica (Harris, Nos. 5438, 5439 (1894) Herb. Kew; Macfadyen (1838) Herb. Kew). Cuba (Combs, No. 571 (1895) Herb. Kew).

Commelin\* describes a red-dye wood which he calls "Corallinum Lignum" (*Erythroxylum americanum*) and the figure is a cultivated plant three years old and 3 ft. high, originally from the American island of Aruba. From this same island there is in the Kew Herbarium specimens of a pod, leaves and flower sent by Dr. Suringar of Leiden in 1884, which has been described by Prof. Urban as *Peltophorum Suringari*.†

According to Browne‡ this tree grows in every part of the island where the soil is dry and rocky. The wood rarely exceeds 8-10 in. in diameter; it is elastic, tough and durable, of a fine orange colour. In his day it was seldom cut for the dyer's use in Jamaica, and the cultivated "Logwood" (*Haematoxylon campechianum*) has long since superseded it from this island.

Macfadyen§ states "I am not aware that it is at present ever cut down for exportation as a dye-wood;" though it is probably this wood that is meant by Holtzapffel|| where he states that "Braziletto is quite unlike the Brazil wood; its colour is ruddy orange, sometimes with streaks; it is imported from Jamaica in sawn logs from 2-6 ft. long and 2-8 in. in diameter with the bark (which is of the ordinary thickness) left on them and also from New Providence in small cleaned sticks." There are in the Museum at Kew two specimens of the wood of the Jamaica Braziletto that would bear out these views—one of them from the Paris Exhibition, 1855, is described as being used for ornamental cabinet work and for wheel spokes—but there is no record of the use of either as a dye-wood. The chips of both specimens, however, yield a red colour in water though of not so pronounced a tint as that obtained from Brazil wood chips or from Lima wood in the Museum.

Harris¶ describes this tree as one of the best native timbers, found in most parts of the island; wood hard and durable, of a bright red colour; used for railway sleepers, wheel-spokes, ornamental cabinet work and for general purposes.

**Haematoxylon Brasileto**, Karst., Fl. Colombia, ii. (1862-69) p. 27, t. 114.

A shrub or small tree, 8-12 ft. high; stem 6 in. in diameter, armed with stout axillary thorns, 3-4 lin. long; 3-5 ft. high, stem deeply furrowed with dull greenish grey bark. Leaves resembling those of *H. campechianum*. Inflorescence as in the species referred to but flowers larger and less numerous. Pod flat, 1-1½ in. long. *Haematoxylon Brasileto*, Engl. Bot. Jahrb. viii. p. 344; Harms in Engl. Bot. Jahrb. xxix. p. 102; *H. campechianum*, H. B. & K. Nov. Gen. vi. (1823) p. 256 (in part);

\* Hort. Med. Amstel. i. (1697), t. 104, p. 203.

† Urban, Symb. Ant. Fl. Ind. Occid. v, p. 363 (1908).

‡ Hist. Jamaica (1789), p. 227.

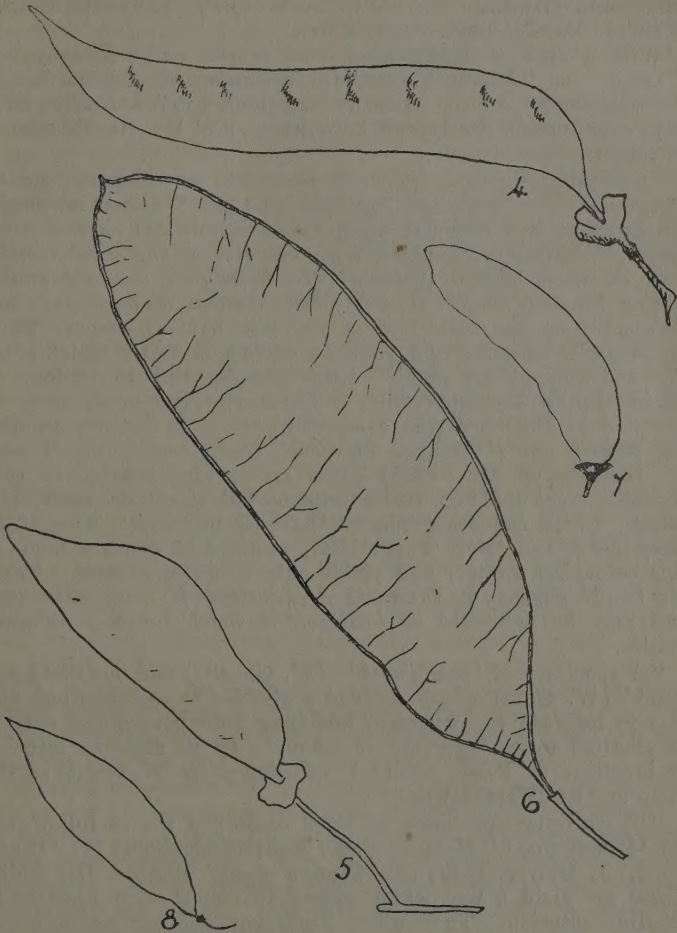
§ Fl. Jamaica (1837), p. 328.

|| Descr. Cat. Woods (London, 1852), p. 77.

¶ Timbers of Jamaica, West Indian Bull. ix. No. 4, 1909, p. 301.



*H. boreale*, S. Watson in Proc. Amer. Acad. xxi. (1886), p. 426;  
Rose in Contr. U.S. Nat. Herb. v. (1899) p. 237.



4. *Caesalpinia bahamensis*; 5. *C. bicolor*.  
6. *Peltophorum brasiliense*.  
7. *Haematoxylon Brasileto*; 8. *H. campechianum*.

Brasil or Braziletto of Colombia (Karsten); Mexico (Watson, Rose). Palo Brazil of Salvador.\* ? Nicaragua Wood, Lima Wood, Peach Wood or Wood of St. Martha. Blood Wood or Red wood of Nicaragua (Dampier); Bois de Lima or Bois de Californie.†

Colombia, Santa Marta (H. Smith, No. 258, 1903, Herb. Kew);

\* Expos. Univ. Paris, 1878, Cat., p. 28—*Emaloxyllum Braçileo*.

† Grisard and Van-den-Berghe, Bull. Soc. d'Accl. 1894, p. 322.

Venezuela (Ernst, Exp. Nacion. Venezuela, i. (1883) p. 248); Mexico (Palmer, No. 125, 1885, Harms, No. 1715, Herb. Kew); Guatemala (Harms, No. 3343, Herb. Kew); Lower California (Palmer, No. 48, 1890, Herb. Kew).

With a view to determining the origin of "Nicaragua," "Lima" or "Peach" wood, the specimens of "Lima" and "Peach wood" in the Museum presented by W. Gourlie have been examined in the Jodrell Laboratory, and Mr. Boodle reports as follows:—

"On comparing four blocks of wood two of which are named 'Logwood,' one 'Streaked logwood,' and one 'bastard logwood,' the structure was found to agree fairly closely but showed some range in certain particulars, e.g., the size of the wood-vessels. Two of these blocks (namely, *Haematoxylon campechianum*, Indian Forestry Dept., O. 4571, Bot. Garden, Saharanpur, and logwood from the collection of the late Prof. Henslow, 1861) are strongly coloured and yield an extract in water which after the addition of an alkali\* turns purple, like the colour of Kleinenberg's haematoxylene. These two specimens may be accepted as *Haematoxylon campechianum*. Of the two remaining blocks, one ('Streaked logwood' from New York, Messrs. A. Lascelles & Co., 1895) gives an extract similar to that obtained from the first two specimens but shows decidedly less colour, while the other block ('bastard logwood,' Messrs. A. Lascelles & Co., New York, 1895) appears to contain none of this colouring matter, and yields only a brown extract. These last two blocks may be the wood of varieties of *H. campechianum*† and may be described as 'bastard logwood' of two different grades.

"A specimen of 'peach wood' (W. Gourlie) and one of 'Lima wood' (W. Gourlie) are decidedly similar to one another and also to logwood in structure, but they both give a red extract in alkaline water, agreeing in colour with an alkaline solution of brazilin. 'Peach wood' is mentioned by Wehmer‡ as the same as 'St. Martha wood.'

"Three other specimens of wood examined are as follows:—(1) 'Brazil wood,' Mexico; Paris Exhibition, 1900; (2) 'Brazil wood,' J. Glover, 1849; (3) 'Sappan wood,' Madras, Dr. Bidie. These all yield a dye which agrees in colour with brazilin in alkaline solution. They differ from one another as follows: No. 1 is distinguished by having rather larger medullary rays than No. 3, while No. 2 differs from Nos. 1 and 3 in having a distinct tier-like arrangement of the rays. In Nos. 2 and 3 tangential bands of parenchyma are much less marked than in No. 1 which approaches 'Peach wood,' 'Lima wood' and *Haematoxylon campechianum* in structure. No. 1 appears not to be true 'Brazil wood,' but Nos. 2 and 3 are probably correctly named, No. 2 being in that case true 'Brazil wood,' which is stated to

\* The chips were boiled in water and some ammonia was then added to the coloured liquid.

† See Gruenberg & Gies, Bull. Torrey Bot. Club, vol. xxi. p. 367.

‡ Wehmer, Die Pflanzenstoffe, p. 324.



be derived from *Caesalpinia echinata*, Lam.\* and No. 3 the wood of *Caesalpinia Sappan*."

The above report is placed with this species because the Museum specimens—Lima and Peach wood—referred to both possess a structure like that of Logwood, but yield a different extract resembling more that of Brazil wood.

Dampier† (1676) who appears to have had a better practical knowledge of the dye woods of the period than any other traveller at that time, recognised in Nicaragua wood something quite different from Logwood—in which trade he worked—and separates with accuracy the contemporary woods; he states:—

"There are other sorts of wood much like it in colour, and used for dyeing also; some more esteemed, others of lesser value. Of these sorts bloodwood, redwood, or Nicaragua wood, and stockfish wood or stockfish-hout are of the natural growth of America.

"The Gulph of Nicaragua, which opens against the Isle of Providence, is the only place that I know in the north seas that produces the bloodwood, and the land on the other side of the country against it in the south seas, produceth the same sorts. The wood is of a brighter red than the logwood.‡ It was sold for thirty pounds per ton, when logwood was but at fourteen or fifteen, and at the same time stockfish wood§ went at seven or eight. This last sort grows in the country near Rio la Hacha to the east of St. Martha, by the sides of rivers in the low land. It is a smaller sort of wood than the former. I have seen a tree much like the logwood in the river of Conception in the Samballas, and I know it will dye, but whether it be either of these two sorts, I know not; besides here and in the places before mentioned, I have not met with any such wood in America.

"At Sherbero, near Sierra Leone, in Africa, there is Camwood|| which is much like bloodwood, if not the same. And at Tonquin, in the East Indies, there is also such another sort;¶ I have not heard of any more in any part of the world."

He further records\*\* in reference to Nicoya, that "by the sea-side in some places there grew some redwood useful in dyeing"; of this, some Spanish Indians informed him that there was little profit made because they were forced to send it to the lake of Nicaragua. At one place he saw 3 or 4 tons of the redwood which he took to be "that sort of wood called in Jamaica, bloodwood or Nicaragua wood."

That "Peach" and "Lima" woods are derived from the same source is borne out by McCulloch†† and Poole,‡‡ who give statistics of the commerce, and also include Nicaragua wood as a synonym. McCulloch says of "Nicaragua wood or peachwood,

\* Weisner, Die Rohstoffe des Pflanzenreiches, ii. p. 932.

† Capt. William Dampier, Voy. Advent. i. (Liverpool, 1769), p. 60.

‡ *Haematoxylon campechianum*.

§ *Chlorophoria tinctoria*. "Fustic" of the present day.

|| *Baphia nitida*.

¶ *Caesalpinia Sappan*.

\*\* Dampier, l.c. i. p. 248.

†† Dict. of Commerce (1834), pp. 851, 852.

‡‡ Statistics of Commerce (1852), pp. 217, 234.

the London dealers distinguish Nicaragua wood into 3 sorts, viz. large (price, £14 to £20 per ton), middling (£8 to £10 per ton), and small (£7 to £8 per ton).” Poole refers to Lima wood as “the finest description of Nicaragua wood, price £13 to £15 per ton duty free (1852), brought from Realijo, Rio de la Hache and Mazatlan”—all localities where we should expect to find *Haematoxylon Brasiletto*. Unfortunately there is no authentic specimen of this wood in the Museum. But, on the request of the Director, specimens have been promised from Colombia, together with herbarium material of the tree, and until these arrive the statements quoted above can only be regarded as provisional.

There is not much doubt that the wood of this species has at times been confounded with that of *H. campechianum*.

Bedford Pim\* may imply this species when he refers to logwood, because the trade referred to is that of Granada on Lake Nicaragua. Whatever may have been intended, however, his note is interesting as showing how the wood was conveyed from the Pacific side to the Atlantic about 50 years ago. “The commerce of Granada is carried on in bongos, which are very primitive specimens of naval architecture, simply a rudely constructed barge of from 8–10 tons. . . . The crew generally consists of 12 men and the patron; these men eat, drink and sleep on their respective thwarts. The cargo is made up of about 100 seroons of indigo or 500 hides or 8 tons of logwood. . . . As may be imagined the bongo is not easily moved, in the wet season for example the average passage up the San Juan alone is 14 days; they are often three weeks from Granada to Greytown.”†

According to Rose‡ though “*Haematoxylon campechianum* is supposed to be the logwood of commerce, the above species is largely exported under that name and has been for many years.” In Mexico he further states the wood known as “Brazil” is largely used throughout the country as a dye-wood, giving a dark brown or red colour, used to colour tomales, mats, and Agave fibre. It is not now so extensively exported from the West Coast as formerly, but it is one of the chief exports from Altata, while much wood is shipped from Piaxtla and also from Mazatlan. The wood from Altata goes chiefly to Havre and Hamburg, ships often being loaded with this wood alone. On account of this extensive cutting it is hard to find specimens of any size along the coast, but in some of the hot interior valleys large shrubs or even small trees are to be seen.

In Venezuela the wood of this species is said to be scarce and little exported—51,342 kilos were shipped from Venezuelan ports in 1882–1883. The scarcity is attributed largely to “the fatal practice of cutting without sowing, a practice which is unfortunately the general rule in the forestry of this country.”§

\* “The Gate of the Pacific” (1863), p. 291.

† On the Atlantic side connected by the San Juan with Lake Nicaragua.

‡ Notes on Useful Plants of Mexico in Contr. from the U.S. Nat. Herb. v. 1899, p. 238.

§ Ernst, La Exposicion Nacional de Venezuela en 1883, i. (Caracas, 1886), p. 248.



**Haematoxylon campechianum**, Linn. Sp. Pl. (1753), p. 384.

A small tree 15-20 ft. high; stem straight in young trees, at times ultimately becoming gnarled or twisted. Leaves pinnate with 4 or sometimes 5 pairs of leaflets, obcordate, glabrous, green. Inflorescence a lax axillary raceme; flowers small, petals 5, yellow. Pod membranous, flat, lanceolate,  $1\frac{1}{2}$ -2 in. long, 1-2 seeded.

Palo del Campeche, Palo del Brasil, of Tabasco, Mexico†; Logwood, Campeachy wood, Poachwood,‡ Jamaica wood, Blue-wood, Blackwood.

There are specimens in the Kew Herbarium from the following places: Jamaica, Trinidad, Tobago, New Providence, Bahama Islands, Mauritius, Dominica, St. Lucia, Porto Rico, Martinique, Cuba, St. Dominique, Guadeloupe, Rodriguez, Madagascar, Gold Coast, Calcutta.

These localities without exception represent cultivated trees, the original home of the plant being Campeachy, Yucatan and British Honduras. In Southern Nigeria it is well established at Oloke Meji, and in Old Calabar a tree planted about 1892 was bearing seeds in 1897.

The principal commercial sources are Campeachy, Yucatan, British Honduras, Mexico, Haiti, St. Domingo, Jamaica, etc. In the Republic of Honduras it is reported§ that Logwood cannot be found there in commercial quantities.

Of all the countries into which Logwood has been introduced it is probable that Jamaica is the most important commercial source. It was introduced into the Colony in 1715, but before then the island was the centre of a large trade in the wood. Sloane|| records that it was cut about the town of Campeche and brought to Jamaica in sloops to be sent to Europe by the traders there, and that "since the year 1715 the first sowing of this seed in Jamaica, many trees have now (1725) produced ripe seeds." In 1876 it was calculated that the tree occupied at least 200 square miles of the island.¶ It appears to have been introduced to New Providence about 1722. Catesby\*\* mentions that "in the year 1725 I saw three of these trees in the island of Providence which were raised from seeds brought from the Bay of Honduras by Mr. Spatches, a person of more than common curiosity. He told me they were of three years' growth from the seeds, they were then about 14 ft. high, their trunks straight and about 7 or 8 in. thick, their heads branching regularly and being in full blossom made a beautiful appearance." It is interesting to note that a large export trade has now grown up in logwood from the Bahamas.††

The trade in the wood was at the first in the hands of the Spaniards, and an important centre of the cutting was Champeton

† Ramirez, Pl. Mexicanum Sin. Vulg. y Cientifica, Mexico, 1902, p. 52.

‡ Gerth van Wijk, Dict. of Plant Names, 1911.

§ Commerce Report, Washington, No. 305, Dec. 30th, 1915.

|| Hist. Jamaica, ii. (1725), p. 183.

¶ Thomson, Rep. Jamaica Coll. Inter. Exhib., Philadelphia, 1876.

\*\* Nat. Hist. Carolina, Florida and the Bahama Islands, ii. (1754), p. 66.

†† Report of the Development Board of the Bahamas, 31st March, 1916: West India Comm. Circ. July 27th, 1916, p. 286.

river, about 10 or 12 leagues to leeward of Campeachy town. It was then worth £90 to £110 a ton, and the Indians cut it for a ryal a day.\* Dampier's cargo (1675) to purchase logwood was rum and sugar—very good commodities, he thought, for the logwood cutters, then about 250 men, mostly English, who had settled in the neighbourhood of One-Bush-Key, Campeachy Bay.†

In the early days of the trade the value of the wood was little known, and it is said that privateers who took ships laden with it saved only the nails and ironwork before sinking them, and it is related that a Captain James who had taken a ship laden with logwood burnt the wood throughout the voyage home, though on arrival he sold the remainder at great profit. It was after his return to Jamaica that the English are said to have discovered where the tree grew in the Bay of Campeachy, and "if they met no prize at sea they would go to Champeton river where they were certain to find large piles cut to their hand."‡ For a time the wood was collected under this system of poaching.§ Catesby|| refers to the bloody disputes which this useful tree occasioned between the Spaniards and the English, and he suggested that the inhabitants of their southern plantations should propagate it to their advantage against the time when they would be wholly deprived of getting it from the Spaniards as usual by force or stealth.

In the reign of Queen Elizabeth, about the time when this wood appears to have been first used as a dye, an Act of Parliament was passed in the 23rd year of her reign (1582) prohibiting its use as a dye under severe penalties, because the colours produced by it proved so fugacious that a general outcry against its use was raised. This law was repealed after being in force for about 100 years, after the discovery "of fixing colours made of 'logwood' alias 'blackwood,' so that by experience they are found as lasting as the colours made with any other sort of dyeing wood whatever."¶ The name 'blackwood' it appears had been given when the wood was used surreptitiously during the period when its use was prohibited by law.

Logwood, since its introduction, has generally maintained its position, and though of less value, after the introduction of the aniline dyes, the trade has never been entirely killed as is the case with most other vegetable dyes; at the present time, owing to the depression in the dye industry on account of the war, the trade has improved everywhere almost to the point of speculation. The use of natural dye-stuffs by American manufacturers represented an output during 1914 to the value of \$1,866,000, the chief of which was logwood extract—14,500

\* Dampier, l.c. i. p. 49.

† l.c. i. p. 21.

‡ l.c. i. p. 49.

§ The name "Poach-wood" given above may have arisen in this way, though I cannot be sure that it may not be intended for "Peach-wood," a name sometimes attributed to this species as well as to *H. Brasiletto*.

|| Nat. Hist. Carolina, Florida, Bahamas, ii. (1754), p. 66.

¶ McCulloch, Dict. Commerce (1834), p. 768.



short tons, value \$1,312,000, or an increase in this dye-stuff alone of 32 per cent. over the production of 1909.\* It may be safe to say that equal activity in the use of this wood is being displayed at home and supplies should be readily obtainable from our own Colonies of Jamaica, British Honduras, Bahamas, etc.

*Haematoxylon campechianum* is one of the few trees yielding a dyewood that it would appear profitable to cultivate, though *Haematoxylon Brasiletto* and *Caesalpinia Sappan*, as yielding "Brazil woods," may be worthy of some further trade development.

The Logwood tree is easily raised from seed and the cultivation is simple, the growth rapid and in favourable situations it spreads so quickly as to become naturalised, as in Jamaica, and thinning and cutting are about all the attention required. In any event, started on waste land it might prove a safe speculation for feeding bees and the production of honey. Provided the temperature is tropical with a good rainfall, soil would seem to be of secondary consideration, though Dampier, whose description of the tree and its native surroundings† is given below, says it will not thrive in dry ground. His information otherwise, however, is of special interest to possible cultivators as being probably the most complete account of the natural conditions under which the tree originally grew. It is also important to remember that "Bastard Logwood"‡—of no value for dyeing purposes—is produced by trees growing side by side with those yielding valuable wood, and the cause of this difference has not yet been determined. No botanical differences have been observed, but if the cause be due to some climatic or soil condition, it is well to know the conditions under which the trees will thrive. Experiments have been started (1903) in Botanical Gardens of Jamaica and New York with seedlings of trees producing normal and abnormal wood in order to try and find out the cause of this variation.

"This part of the bay of Campeachy lies in about 18 deg. of North Lat. . . . The dry season begins in September and holds till April or May; then comes in the wet season which begins with tornados. . . . The land near the sea or the lagunes is mangrovy, and always wet, but at a little distance from it is flat and firm and never overflowed, but in the wet season. The soil is a strong yellowish clay, the upper coat or surface is a black mold tho' not deep. Here grow divers sorts of trees of no great bulk nor weight. Among these the logwood trees thrive best, and are very plentiful; this being the most proper soil for them; for they do not thrive in dry ground, neither will you see any growing in rich black mould. They are much like our white thorns in England, but generally a great deal bigger; the rind of the young growing branches is white and smooth, with some prickles shooting forth here and there; so that an Englishman not knowing the difference would take them for white thorns, but the body and the old branches are blackish; the rind rougher with few or no prickles. The leaves are small

\* Commerce Report, Washington, No. 102, 1916, May 1st, p. 407.

† Voy. and Advent., i. (1769), pp. 57-59.

‡ See Mr. Boodle's remarks on the Museum specimens under *H. Brasiletto*.

and shaped like the common white thorn leaf, of a palish green. We always chuse to cut the old black-rinded trees, for these have less sap, and require but little pains to chip or cut. The sap is white, and the heart red; the heart is used much for dyeing, therefore we chip off all the white sap till we come to the heart; and then it is fit to be transported to Europe. After it has been chip'd a little while, it turns black; and if it lies in the water it dyes it like ink, and sometimes has been used to write with. Some trees are five or six feet in circumference; these we can scarce cut into logs small enough for a man's burden, without great labour, and therefore are forced to blow them up. It is a very ponderous sort of wood, and burns very well, making a clear strong fire, and very lasting. We always harden the steels of our fire-arms when they are faulty, in a log-wood fire, if we can get it, but otherways as I said before, with Burton-wood or the grape tree. The true logwood, I think, grows only in this country of Yucatan, and even there, but only in some places near the sea. The chief places for it are either here or at Cape Catoche, and on the south side of Yucatan in the Bay of Honduras."

Some further particulars with references to illustrations and to the literature on this tree are given in *Kew Bull.* Add. Series ix., part 2, 1911, pp. 253-255.

Other woods that have been called "brazil" or "brasileto" at various times, but which appear to deserve no more than passing mention are: *Condalia obovata*, Hook.\* (*Rhamnaceae*), known as "brasil" and "logwood," "bluewood" and "purple haw," native of New Mexico, Western Texas, etc., where it is said to be one of the common "chaparral" plants, forming dense impenetrable thickets. A specimen of the wood in the Kew Museum shows no colour. *Comocladia dentata*, Jacq.† (*Anacardiaceae*), "bastard brazil," native of Cuba, St. Domingo; wood dark red, said to dye like brazil wood; juice dyes the skin black. *Comocladia ilicifolia*, Sw.‡ "St. Domingo brasileto," said to be used in dyeing, juice staining the skin black. *Trichilia spondioides*, Swartz§ (*Meliaceae*), "bastard brazil," Jamaica and Hispaniola; wood said to be used in dyeing. *Caesalpinia bijuga*, Swartz|| (referred to *C. vesicaria*, Linn., see below), "bastard Nicaragua wood," brown, dyes red. *Caesalpinia vesicaria*, Linn.,¶ "palo campeche," Cuba (Wright). "Palo negro" Cuba (Eggers), "bastard Nicarago" or "Indian Savin Tree." Jamaica (P. Browne), "brésillet à vessies" (Lamarck), native of Cuba, Campeachy, Yucatan, Jamaica, etc. *Erythroxylum ovatum*, Cav.\*\* (*Lineae*), "brésillette St. Barthélemy," a shrub or tree, native of Antigua, Dominica. Mar-

\* Coulter, Contr. U.S. Nat. Herb. ii. No. 1, 1891, p. 58; Sargent, Sylv. N. Amer. ii. p. 25; Pringle, Garden and Forest, ii. p. 393, who states that the wood dyes blue.

† Redwood, Suppl. Pharmacopœia (London, 1857), p. 258.

‡ l.c. p. 259.

§ l.c. p. 241.

|| l.c. p. 268.

¶ Urban, Symbol. Antilles, ii. (1900-01), p. 283.

\*\* l.c. v. p. 208.



tinique, St. Lucia, etc. *Caesalpinia Rugeliana*, Urban (*C. crista*, A. Rich.),\* "brasilete colorado," a thorny shrub, native of Cuba.

LIST OF PODS ILLUSTRATED IN THE TEXT.

Figs. 1-3, p. 213; Figs. 4-8, p. 217.

- Fig. 1. *Caesalpinia Sappan*, outlined from specimens in Museum, from Pegu (Dr. McClelland); *a*, closed pod; *b*, open half of pod.  
 Fig. 2. *Caesalpinia echinata*, copied from Martius, Fl. Bras. xv. part 2, t. 22; *a*, closed pod; *b*, open pod.  
 Fig. 3. *Caesalpinia brasiliensis*, copied from Plumier, Nova Pl. Amer. Genera (Paris, 1703), t. 9; *a*, closed pod; *b*, part of open pod.  
 Fig. 4. *Caesalpinia bahamensis*, specimen in Herbarium from the Bahamas (Britton and Millspaugh, No. 2883).  
 Fig. 5. *Caesalpinia bicolor*, specimen in Herbarium from Colombia (R. B. White, 1895).  
 Fig. 6. *Peltophorum brasiliense*, specimen in Herbarium from Jamaica (Harris, No. 5439, 1894).  
 Fig. 7. *Haematoxylon Brasiletto*, specimen in Herbarium from S. W. Chihuahua, Mexico (Dr. E. Palmer, 1885).  
 Fig. 8. *Haematoxylon campechianum*, specimen in Herbarium from Trinidad (A. Fendler, No. 349, 1877-80).

## XLI.—NOTE ON A BOTRYTIS DISEASE OF FIG TREES.

STUDIES FROM THE PATHOLOGICAL LABORATORY: III.

WILLIAM B. BRIERLEY.

(With Plates.)

One of the most common diseases to which fig trees in this country are subject is a "fruit" rot due to the fungus *Botrytis cinerea*, Pers. This is described by Massee as follows (Massee, G. "Diseases of Cultivated Plants and Trees," pp. 459-460, England, 1910), "Figs grown under glass very frequently become diseased when half-ripe. The free end of the fruit presents a waterlogged appearance and finally collapses with a wet rot. The injury is caused by *Botrytis cinerea*, which eventually covers the decayed 'fruit.' I have observed that under certain conditions that figs, when becoming ripe, emit a small amount of a sweet liquid through the pore at the apex of the 'fruit.' *Botrytis* spores germinate readily in this liquid, the mycelium passing into the soft tissues of the fig and causing the disease."

When examining a number of fig trees growing in a garden in Mortlake it was noted that those which showed much diseased "fruit" were also affected with a die-back of the young green shoots; whilst this was practically absent from trees bearing healthy "fruit." On the dead shoots were pustules of *Botrytis conidiophores*.

\* Urban, Symbol, Antilles (1900-01), ii. p. 278.

At the time only a few somewhat casual observations on this disease were made.

By means of a penknife blade *Botrytis* conidia were transferred to the apical pore of six figs of almost mature size. Of these, three were inoculated with spores from a dead shoot, and three with spores from a diseased "fruit"; the knife blade being sterilised in a match flame between each transfer. The conidia were placed in the pore, which was dry, and care was taken to avoid injury. A fortnight later all the inoculated "fruits" were diseased, whilst no other figs on this tree were found affected.

In a similar manner spores were transferred from diseased "fruit" and dead shoots to living shoots and placed in excisions made in the twig, in leaf axils, and in the apical bud. Other shoots were similarly cut but not inoculated, to remain as checks. Conidia were also placed on the unwounded surfaces of healthy shoots. In every case where spores were inserted in a wound the shoots were killed, and pustules of *Botrytis* conidiophores were formed. On the other hand shoots which had been merely wounded, or inoculated on unwounded surfaces, remained perfectly healthy. In all these experiments no differences could be observed in the results, which might indicate that two species or strains of the fungus were present.

The experimental figs and shoots were examined, and, with the exception of one shoot, *Botrytis* mycelium only was present in the tissues. The one exception gave rise to the fructifications of a species of *Tubercularia*.\*

Subsequently a large series of inoculation experiments with pure cultures of the fungus derived from Southampton and Mortlake were commenced and are now in process of completion. The detailed results of this investigation will be published in a later communication, but it may be stated that the results already obtained confirm those of the preliminary experiments.

**Growth in Pure Culture.**—The fungus grows profusely on most media, its form approximating to that of *Botrytis cinerea*, Pers., although like all species of *Botrytis*, it shows very considerable variation in size of conidiophore and spore, and in the

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\* This fungus is commonly found on dead shoots of *Ficus carica*, but as fig trees often show old dead branches bearing *Nectria cinnabarina*, Fries., the *Tubercularia* was at first merely attributed to the conidial stage of this fungus. On examination it proved to be different, and also appeared to be distinct from *Tubercularia nigricans*, Bull. (Lindau in "Rabenhorst's Kryptogamen Flora," Bd. I., Abt. IX., p. 426) and *Tubercularia atra*, Passer (Passer in Rendic. Acc. Lincei Roma IV., 2 sem. p. 105 (1888)), both of which have been recorded upon dead shoots of fig trees. Edgerton (Phytopath. Vol. I., No. I. p. 12 (1911)), has described a canker of fig trees due to a fungus which he has named "*Tubercularia Fici*" and which is characterised by setae scattered through the sporodochia. The present *Tubercularia* lacks such setae and kills the shoot without any canker formation. Frequently the *Tubercularia* follows the *Botrytis* disease as a saprophyte, but inoculation experiments carried out with pure cultures of the fungus have shown that it can function as an aggressive parasite, usually gaining admittance to the shoot through the fruit scars. Further observations on this disease are being made.

diameter of the hyphae. Cultures have been made from diseased "fruit" and shoots obtained from trees in Mortlake, Kew and Southampton, but no constant differences can be detected. After a varying period of time abundant sclerotia are formed, which arise in an irregular manner and project above the surface of the medium. They are jet black in colour, somewhat nodular in form, and vary in size from a mere point to bodies with a diameter of two or three millimetres. On germination, which usually follows after a considerable resting period, they give rise always to *Botrytis conidiophores*.

When growing in culture media the fungus is characterised by the very profuse development of "haptera" which assume an olive-green to grey-black colour.

A detailed comparative study of the physical and chemical relations of the fungus, and the conditions of its virulence is in progress, and will form part of the full paper.

**The Disease on the "Fruit."**—Infection may occur at any point, but usually the attack commences at the pore, and thence rapidly spreads until the entire "fruit" is enveloped in a grey mould of *Botrytis conidiophores* (Plate IX., figs. 1-4). The advancing edge of the disease is marked by a brown or purplish line behind which the tissues are sodden and discoloured. At a distance of about ten to twenty millimetres away from the healthy tissues the fungus conidiophores appear (Plate IX., fig. 2). At first these are pure white, but rapidly turn to a dull grey. If a diseased "fruit," be cut open it will be found that the central cavity is usually free from mycelium. The fungal hyphae penetrate the tissues in all directions causing a partial solution of the cell walls and a collapse of the cells; and advance with great rapidity.

By the time the fig is completely enveloped it has shrunk considerably in size, and after a few weeks shrivels to a mummified condition (Plate IX., figs. 3 and 4; Plate VIII., fig. 3). In this state it often hangs on the tree during the winter, and the following spring and early summer gives rise to abundant conidiophores.

The latter arise in clusters from irregular sclerotial masses of hyphae which frequently give the mummified "fruit" a nodular and very irregular shape. Externally the sclerotia are greyish-black, but are cream coloured in section and glisten slightly when freshly cut. They are soft, and cheese-like of texture.

Conidia taken from such "mummies" which had overwintered on the tree, proved readily capable of reproducing the disease on both shoot and "fruit."

On trees which are badly diseased these mummified "fruits" are found in great abundance, and on one such tree trained against a wall 83 were counted.

**Die-back of the Shoots.**—When a shoot is inoculated the mycelium at first tends to spread equally in all directions, and rapidly encircles the shoot. It then slowly progresses upwards in the tissues and more rapidly downwards. The shoot above the diseased area soon dies and usually becomes shrivelled and



brown (Plate VIII., figs. 1-3). The growth of the mycelium appears to be confined to the one season so that it does not advance from the dead shoot further into the tree the following year.

The mycelium is chiefly found in the cortex of the shoots and the hyphae are stout and freely branched, penetrating the tissues rapidly in all directions. They do not appear to exert the same destructive action upon the cell walls as was noted in the fruit, but the cells are killed and collapse.

At different levels in the cortex loose aggregations of hyphae are formed, which become more solid as they reach the periphery. These rupture the epidermis and appear as numerous pustules of a greyish-brown colour from which arise the conidiophores. The latter are somewhat stout and thick and the conidia large.

In certain of the shoots, but not perhaps in a majority, the fungus remains alive during the winter and gives rise to successive crops of conidia the following year. Such conidia are capable of reproducing the disease when inoculated into shoots and "fruits."

**Control Measures.**—It is evident that the fungus is carried over the winter in the mummified "fruits" and dead shoots; and therefore that any treatment must be based on the elimination of these two sources of infection. Careful attention to this is all that appears to be necessary; for badly diseased trees which have been so treated have entirely recovered and now bear healthy and full crops.

#### EXPLANATION OF PLATES VIII. AND IX.

**Plate VIII.**—Fig. 1. Shoot inoculated at X and killed by the fungus which has progressed down the shoot to Y. The figs were unable to develop and dried up to the condition shown. Undeveloped figs which may result from many causes must not be confused with the mummified "fruits" resulting from the attack of the fungus, and may be distinguished by the fact that they are smooth and without the irregular nodular form of the "mummies," are usually greenish-brown in colour and are free from fungus.

Figure about one-half natural size.

Fig. 2. Shoot inoculated at apex X and killed, the fungus penetrating down the shoot to Y. The uppermost lateral buds which develop the following season usually give rise to primitive leaves.

Figure about two-thirds natural size.

Fig. 3. Fig inoculated at the pore X. The fungus enveloped the "fruit" and passed down the stalk into the shoot which it killed as far as Y. The fig is a true mummy resulting from fungal attack.

Figure about one-third natural size.

In all these cases the conidia used for inoculation were derived from pure cultures of the fungus from diseased "fruits."

**Plate IX.**—The "fruits" were inoculated when almost fully grown and five days after each other, *i.e.*, figure 4 on June 5th, and figure 1 on June 20th. On June 25th they were gathered







and photographed. The spores used for inoculation were from pure cultures of the fungus on the shoot, and in each case they were placed in the pore of the "fruits."

Fig. 1. The tissues for about 1.5 cm. diameter around the pore are discoloured and slightly depressed, and conidiophores are beginning to develop on the surface.

Fig. 2. About one-half the "fruit" is diseased, and 10 mm. to 15 mm. behind the advancing edge which is here clearly visible at X, the diseased tissues are covered by fungus conidiophores. The collapse of the tissues is apparent in the altered size and shape of the fig.

Fig. 3. The entire "fruit" is enveloped by the conidiophores of the fungus and further shrinkage has occurred.

Fig. 4. The fig is shrivelling to a mummified condition.

## XLII.—DIAGNOSES AFRICANAE: LXIX.

1601. *Macrolobium elongatum*, *Hutchinson* [Leguminosae-Amherstieae]; affinis *M. Heudelotii*, Planch., sed foliis abrupte acuminatis infra laxe reticulatis, inflorescentiae ramis longioribus, alabastris floribusque multo majoribus differt.

*Arbor* parva, ramosa; ramuli ultimi valde flexuosi, lenticellis minutis numerosis instructi, ceterum glabri, parum complanati. *Folia* paripinnata, petiolo communi usque ad 6 cm. longo; foliola 2-juga, breviter petiolulata, elliptica vel ovato-elliptica, abrupte obtuse acuminata, basi rotundata vel rarius subcuneata, 7-14 cm. longa, 4.5-6 cm. lata, firme chartacea, utrinque glabra et nitidula, laxe reticulata; nervi laterales utrinsecus circiter 6, arcuati, intra marginem conjuncti, infra prominentes; petioluli crassi, transverse rugosi, 4-5 mm. longi. *Stipulae* persistentes, subfoliaceae, oblanceolatae vel elliptico-oblanceolatae, obtusae, 5-7 mm. longae, 2-3 mm. latae, nervosae, glabrae. *Paniculae* racemiformes, elongatae, usque ad 30 cm. longae, ubique minute puberulae; rami demum reflexi, ad 5 cm. longi; ramuli ultimi circiter 0.5 cm. longi, pauciflori; pedicelli 4-5 mm. longi, puberuli. *Alabastra* bracteolis involucreta, obovoidea, 1 cm. longa. *Bracteolae* 2, oppositae, obovatae, apice rotundatae, minute tomentellae. *Receptaculum* tubulosum, 3 mm. longum, glabrum. *Sepala* 4, oblonga, obtusa, 6 mm. longa, 3 mm. lata, glabra. *Petala* sepalis multo longiora, obovato-oblanceolata, glabra. *Filamenta* glabra. *Ovarium* dense brunneo-tomentosum.

TROPICAL AFRICA. Sierra Leone: Pujahun, Feb., *Lane-Poole* 161.

1602. *Cotyledon fusiformis*, *Rolfe* [Crassulaceae]; affinis *C. mamillari*, Linn. f., sed foliis basi angustioribus, calycis lobis acuminatis, et colore florum differt.

*Caulis* erectus, sublignosus, brunneo-striatus, circiter 20 cm. altus, foliatus. *Folia* subfusiformia, crassa, subobtusata, glauca, minutissime puncticulata, 5-7 cm. longa, 1-1.2 cm. lata, basi attenuata. *Scapus* terminalis, suberectus, circiter 10 cm. longus,

parce ramosus, pauci vel pluriflorus. *Flores* solitarii, brevissime pedicellati, subhorizontales. *Bracteolae* ovatae, minutae. *Calyx* 2 mm. longus; lobi subulati, acuminati, 1 mm. longi. *Corolla* 1.2 cm. longa; tubus cylindricus, pallide viridis; lobi recurvi, ovati, acuminati, albi, apice pallide purpurei, 2 mm. longi. *Stamina* tubo corollae adnata, exteriora circiter 9 mm. longa, interiora 7 mm. longa. *Carpidia* gracilia, circiter 1.1 cm. longa; styli subgraciles.

SOUTH AFRICA. Without precise locality, *H. H. W. Pearson*, 5585. (Percy Sladen Memorial Expedition.)

Flowered at Kew in July, 1916. Nothing like this plant is recorded in Schönland's account of the *Crassulaceae* collected during the expedition, possibly because the plant may have been collected out of flower, and consequently no dried specimens preserved. It is very nearly allied to *C. mamillaris*, Linn. f., which is very imperfectly represented in the Herbarium, but which, according to the Botanical Magazine figure (t. 6020) has the lobes of the corolla dark red-purple and the tube yellow, while in the present one the lobes are white with pink tips, and the tube very pale green. There are also other differences which prevent our plant from being referred to *C. mamillaris*.

1603. **Dissotis Lambii**, *Hutchinson* [Melastomaceae-Osbeckieae]; affinis *D. grandiflorae*, Benth., sed caulibus parce setulosis, foliis multo majoribus breviter appresse setulosis, staminibus longioribus differt.

*Caulis* 1.25-1.5 m. altus, erectus, simplex vel subsimplex, basin versus foliatus, superne nudus, parce setulosus vel setosus, internodiis elongatis. *Folia* elongato-lanceolata, acuta, basi subobtusata, 10-12 cm. longa, 1.2-5 cm. lata, setoso-ciliata, ciliis ascendentibus 1.5-2 mm. longis, conspicue trinervia, utrinque breviter appresse setulosa, nervis supra impressis infra prominentibus; petioli 3-5 mm. longi, longe setosi. *Flores* magni, in paniculam terminalem circiter 30 cm. longam et 20 cm. latam dispositi; rami usque ad 10 cm. longi, angulares, in angulis setulosi; pedicelli ultimi basi longe setosi, circiter 0.5 cm. longi. *Receptaculum* primum cylindricum, demum campanulatum, fere 1 cm. longum, squamis semiorbicularibus longissime setosis obtectum. *Calycis* segmenta mox decidua, oblongo-lanceolata, 1 cm. longa, 2-3 mm. lata, minute ciliata, apice pilis longe setosis stramineis 3-5 instructa. *Petala* 5, obovata, circiter 4 cm. longa, usque ad 3 cm. lata, glabra. *Stamina* valde inaequalia, breviora 2 cm. longa, longiora 4 cm. longa; antherae circiter 1 cm. longae. *Stylus* gracilis, 3.5 cm. longus, glaber.

TROPICAL AFRICA. Nigeria: Northern Provinces; Kaduna, Oct., *Lamb* 58.

This is a very fine species allied to *D. grandiflora*, Benth., from Senegambia and Sierra Leone, but with much larger leaves and big handsome flowers.

1604. **Nesaea (§*Salicastrum*) hispidula**, *Rolfe* [Lythrarieae]; inter species africanas adhuc descriptas ramulis foliisque pilis hispidulis copiose vestitis facile distinguenda.

*Fruticulus* perennis, ramosissimus, 30–60 cm. altus. *Ramuli* subteretes, copiose cinereo-hispiduli. *Folia alterna*, numerosa, sessilia, linearia, subacuta, 0·8–1·2 cm. longa, copiose cinereo-hispidula, pilis patentibus, basi subsagittata, margine revoluta. *Cymae* axillares, breves, subcapitatae, pauciflorae. *Bracteae* lanceolato-oblongae, subobtusae, 1 mm. longae. *Pedicelli* 1·5–2 mm. longi. *Calyx* campanulatus, hispidulus, 3–3·5 cm. longus; lobi ovati, acuti, circiter 1 mm. longi. *Petala* obovata, circiter 3 mm. longa, rosea. *Stamina* 0·6 cm. longa. *Stylus* 0·8 cm. longus.

TROPICAL AFRICA. British East Africa: at Nairobi, A. Whyte; E. Battiscombe, 69; W. J. Dowson 67, 332.

1605. ***Odontospermum lanzarotense***, *Hutchinson* [Compositae-Inuloideae]; species subacaulis, foliis dense confertis dentatis breviter hispidis capitulis magnis distincta.

*Planta* humilis, subacaulis, usque ad 5 cm. alta, basi lignosa. *Folia* conferta, subrosulata, longe petiolata, spatulato-obovata, apice obtusa, petiolo incluso 2–3·5 cm. longa, 0·6–1·3 cm. lata, superne argute dentata, rigide chartacea vel subcoriacea, 1-nervia, utrinque et margine breviter hispida. *Capitula* breviter pedunculata, circiter 3 cm. expansa, pedunculis usque ad apicem foliis paucis anguste oblanceolatis instructis. *Involutri bracteae* 3–4-seriatae, lineares vel lineari-lanceolatae, apice acutissimae, circiter 1 cm. longae, rigide coriaceae, extra dense appresse pilosae. *Receptaculum* planum, rigide paleaceum, paleis subulato-lanceolatis acutissimis 5 mm. longis marginibus membranaceis minute ciliolatis. *Flores radii* numerosi; corollae tubus angustissimus, 2 mm. longus, glaber; limbus oblongo-lanceolatus, apice acute trifidus, circiter 1·4 cm. longus, 2·5 mm. latus, basin versus 4-nervius, superne 6-nervius. *Flores disci* numerosi; corollae tubus inferne angustissimus, superne leviter sensim ampliatus, glaber, 4 mm. longus; lobi 5, lineari-lanceolati, acuti, 1·5 mm. longi, glabri. *Achaenia* (immatura) 1·5 mm. longa, parce puberula. *Pappi* squamae 0·75 mm. longae, apice denticulatae.

CANARY ISLANDS. Lanzarote, March, *Rev. R. T. Lowe*.

1606. ***Thesium cruciatum***, A. W. Hill [Santalaceae]; species *T. hystricoidei*, A. W. Hill, habitu similis sed *T. lacinulato*, A. W. Hill, arcte affinis, a quae floribus glabris, lacinulis undulatis antherisque majoribus praecipue differt.

*Suffrutex* perennis circiter 30 cm. altus; rhizoma crassum lignosum, ramis et ramulis rigidis apice spinosis indumento minutissimo puberulo obtectis cortice longitudinaliter ruguloso. *Folia* squamiformia, subulata, acuta vel acuminata, ramis appressa, 1–2 mm. longa, apice fusca, glabra. *Flores* axillares, pedicellati, ad ramulorum bases congregati; bracteae et bracteolae squamiformes, minutae. *Perianthium* 2 mm. longum, extra glabrum glandulis externis cvoidis instructum, segmentis 1 mm. longis ovatis subacutis erectis cucullatis marginibus lacinulis membranaceis undulatis antheras amplexantibus



instructis. *Antherae* 0.65–0.75 mm. longae, exsertae, filamentis 0.5 mm. longis. *Stylus* crassus, 0.5 mm. longus. *Fructus* immaturus, costatus, glaber.

SOUTH-WEST AFRICAN PROTECTORATE. Plains South of Choaberib (6–1–16), *H. H. W. Pearson* 9447; sandy Plains north of Areb (5–1–16), *H. H. W. Pearson* 9474.

This species collected by Prof. Pearson on his recent Percy Sladen Memorial Expedition (1915–16) to Keetmanshoop-Ababies-Windhoek, closely resembles *T. Hystrix*, A. W. Hill and *T. hystricoides* in its general spinous habit and wrinkled cortex. The flowers, however bear undulate lacinulae on the perianth segments which more or less enfold the anthers, and the nearest ally of this plant is no doubt *T. lacinulatum*, A. W. Hill, collected by Prof. Pearson in the Great Karasberg.

In the key to the species of *Thesium* given in the *Flora Capensis* it should be placed next to *T. lacinulatum*.

1607. **Ficus Burt-Davyi**, *Hutchinson* [Moraceae]; affinis *F. natalensi*, Hochst., sed foliis ellipticis vel oblongo-ellipticis nervis lateralibus plerumque 5, ostiolo parvo vix umbonato differt.

*Frutex* vel arbor parva; rami cortice cinereo obtekti, juniores minute et molliter puberuli. *Folia* elliptica vel oblongo-elliptica, utrinque rotundata vel apice leviter acuminata, 2.5–6.5 cm. longa, 1–4.5 cm. lata, tenuiter chartacea, utrinque glabra; costa ad laminae apicem sensim angustata, infra subprominens; nervi laterales utrinsecus circiter 5, intra marginem multi-ramosi, infra distincti et leviter prominentes; venae delicate reticulatim anastomosantes; petioli circiter 1 cm. longi, glabri; stipulae caducae, acuminatae, usque ad 2.5 cm. longae, submembranaceae, rubro-brunneae et glabrae. *Receptacula* axillaria, plerumque geminata, pedunculata, subglobosa, 0.7–1 cm. diametro, minute puberula vel fere glabra; pedunculi 2–6 mm. longi, puberuli. *Bractee* basales submembranaceae, basi connatae, tenuiter puberulae. *Ostiolum* bilabiatum, hians; bractee in receptacula descendentes. *Flores* ♂ perianthio membranaceo et stamine solitario.—*F. natalensis*, Mildbr. et Burret in Engl. Bot. Jahrb. xlv. 255, non Hochst. *F. natalensis*, var. *pedunculata*, Sim, For. Fl. Port. E. Afr. 98.

SOUTH AFRICA. Coast Region: Riversdale Div.; near Gauritz River Bridge, *Galpin* 4579. Knysna Div.; in the forest near the quarry at Knysna, *Burchell* 5412. Uitenhage Div.; near Enon, *Drège a.* Port Elizabeth Div.; near the burial ground at Port Elizabeth, *Burchell* 4306; Valley near Port Elizabeth, *Paterson*; Krakakamma, *Zeyher* 557. Bathurst Div.; between Riet Fontein and the sea shore, *Burchell* 4112; between Port Alfred and Kaffir Drift, *Burchell* 3851. Queenstown Div.; Zwart Kei River, Junction Farm, *Galpin* 8172. Glen Grey Div.; White Kei Falls, *Galpin* 2507. Albany Div.; on the rocks of Zwartwarter Poort, *Burchell* 3411; Koure West, *Burt-Davy* 7954; Howison's Poort, *Salisbury* 440 a; Alicedale Poort, *Salisbury* 440; East London Div.; Cove Rock, *Galpin* 3104.

Komgha Div.; in woods near Komgha, *Flanagan in MacOwan Herb. Austr. Afr.* 1531.

Central Region: Graaff Reinet Div.; mountains near Graaff Reinet, 1400 m., *Bolus* 711.

Eastern Region: Transkei Div.; Kentani forests, *Pegler* 1125, 1342. Natal; Durban, *Cooper* 3159; *Burt-Davy in Herb. Wood* 12845, 12874; Maritzburg, *Sim*, 7123; Dumisa Station, *Rudatis* 1144; without precise locality, *Sanderson*.

In herbaria this species will be found with *F. natalensis*, Hochst., with which it has been confused; it may be readily separated by the rounded (not stipitate) base of the receptacle, smaller ostiole, and differently shaped leaves with delicate reticulation.

1608. **Thuranthos**, *C. H. Wright* [Liliaceae-Scilleae]; genus novum ex affinitate *Drimiae*, Jacq., a qua perianthii segmentis liberis bulboque squamato differt; ab *Albuca*, Linn., perianthii segmentis homomorphis, interioribus non conniventibus bulboque squamato distinguitur.

*Bulbus* squamis crassis carnosus instructus. *Folia* hysterantha, radicalia, linearia. *Flores* racemosim dispositi; pedicelli sub anthesi decurvati, postea erecti; bracteae parvae. *Perianthii* segmenta 6, aequalia, uninervia, reflexa. *Stamina* 6; filamentorum duae partes inferiores compressae, valide incurvatae, tertia pars superior cylindrica, erecta; antherae oblongae, dorsifixae. *Ovarium* trilobatum, triloculare; stylus columnaris; stigma discoideum; ovula plura.

**T. macranthum**, *C. H. Wright*, species unicum.—*Drimia?* *macrantha*, Baker in Engl. Bot. Jahrb. xv. Heft 3, p. 7, and in This.—Dyer, Fl. Cap. vi. p. 442. *Ornithogalum?* *macranthum*, Baker in Journ. Linn. Soc. xiii. 280.

SOUTH AFRICA. Coast Region: Uitenhage Div.; Van Stadens River, below 200 ft., *Drège* 2204. Queenstown Div.; flats by the Zwart Kei River, 4000 ft., *Drège* 3531. East London; between Gonubie and Kwelegga Rivers, 300 ft., *Galpin* 5812. Komgha Div.; damp valleys between Komgha and the mouth of the Kei River, 1500 ft., *Flanagan* 468.

Eastern Region: Transkei; valleys, 1200 ft., *Miss Pegler* 79. Tembuland; Umtata, *G. E. & Miss M. H. Mason*. Griqualand East; river banks near Kokstad, *Haygarth in Herb. Wood*. 4211.

This plant is so different from the genera into which it has been doubtfully placed that it merits raising to generic rank. It differs from *Drimia* in the absence of a campanulate perianth-tube, and from *Ornithogalum* in its scaly bulb (like that of some lilies) and in the perianth-segments having a 1-nerved midrib. It is more closely allied to *Albuca*, which differs in having the inner perianth-segments erect and shorter than the outer, as well as in the different structure of the filaments. In *Thuranthos* the lower two-thirds of the filaments are coloured like the perianth, flattened, incurved nearly a quarter of a circle and connivent above, thus resembling some paper lanterns with longitudinal interstices. The upper parts of the filaments are white,

cylindrical, and stand erect around the columnar style. The flowers are sweet-scented and open suddenly in the late afternoon or evening.

The generic name is derived from *θυρα*, an opening, and *ανθος*, a flower, in allusion to the interspaces between the lower parts of the filaments.

1609. **Coelorhachis capensis**, Stapf [Gramineae § Andropogoneae]; affinis *C. afraurita*, Stapf, sed racemis perpaucis solitariis robustioribus, pedicellorum auriculo minuto, spiculis sessilibus majoribus, pedicellatis neutris saepe ad glumas reductis diversa.

*Gramen* perenne, glaberrimum, dense caespitosum, innovationibus intravaginalibus. *Culmi* 25–30 cm. alti, circiter 3-nodi, erecti, inferne lateraliter compressi, e nodis ramosi, ramis solitariis. *Foliorum* vaginae glabrae, dense striato-nervosae, inferiores lateraliter admodum compressae, 5–12 cm. longae; ligulae breves, truncatae, minutissime ciliolatae; laminae lineares, acutae, basi sensim in vaginam abeuntes, arcte plicatae, ad 20 cm. longae, explicatae ad 12 mm. latae, firmulae, saepe tortae, rubescentes, praeter apices scaberulos laeves, acute carinatae, nervis numerosis arctis tenuibus. *Racemi* spiciformes terminales et axillares, 2–3, solitarii, remoti, terminales tandem e vagina aphylla vel subaphylla exserti, subcylindrici, recti vel curvati, flavido-virescentes, ad 7 cm. (vel ultra?) longi, 2–3 mm. diametro; articuli superne clavato-cuneati, inferne lineares et a dorso valde compressi, apice excavato, in dorso nervoso-striati, 4 mm. longi, exappendiculati; pedicelli articulis aequilongi et paralleli, ab iis distantes, anguste lineares, apice ex angulo articulo approximato minute dentato-auriculati. *Spiculae* sessiles oblongae, obtusae, 4.5 mm. longae, a dorso compressae, basi transverse admodum constrictae, callo brevi cum pedicelli et articuli basibus in anulum conflente. *Glumae* subaequales, inferior coriacea, dorso applanata, laevis, carinis superne anguste alatis, alis apice conjunctis, nervis intracarinibus 5 extus plane obscuris; superior subacuta, acute plicato-carinata, 3-nervis. *Valva* anthoecii inferioris glumam superiorem subaequans, subacuta, hyalina, 2-nervis, vacua, anthoecii superioris late oblonga, obtusa, 3.5–4 mm. longa, tenuiter membranacea, 3-nervis, cum valvula aequilonga et simillima nisi 2-nervi. *Spiculae pedicellatae* sessilibus similes, sed minores 2–4 mm. longae, neutrae, saepe ad glumas reductae, quarum inferior uno tantum latere alato-carinata et leviter nervoso-striata.

SOUTH AFRICA. Coast Region: Stutterheim Div.; Fort Cunningham, *Sim* 2733.

The type may be found in the collections of the British Museum.

1610. **Schismus pleuropogon**, Stapf [Gramineae § Festuceae]; affinis *S. aristulato*, Stapf, sed duratione, glumarum nervis paucioribus, valvis acuminatis tenuiter nervosis ad latera tantum pilosis, antheris minoribus distinctus.



*Gramen* perenne, caespitosum, circiter 15 cm. altum. *Culmi* geniculato-erecti, graciles, 2-3-nodi, internodiis superioribus e vagina exsertis. *Foliorum* vaginae laevissimae, glaberrimae, nervoso-striatae; ligulae ad lineam ciliolatam reductae; laminae setaceo-involutae, subacutae, ad 5 cm. longae, explanatae 1-1.5 mm. latae, firmulae, laeves, glabrae, utrinque nervis 3-5. *Panicula* spiciformis, 2-2.5 cm. longa, anguste oblonga, ramis ramulisque scabriusculis. *Spiculae* 3-4 mm. longae, breviter vel brevissime pedicellatae. *Glumae* subaequales, a latere visae lanceolatae,, acutae vel acutissimae, spicula paulo breviores, 3- vel (inferior) sub-4-nerves, margine scarioso latiusculo. *Valvae* a latere visae oblique lanceolatae, acuminatae, 2.5 mm. longae, e sinu mucronulatae (anthoeciorum inferiorum) vel aristulatae aristula ad 1 mm. longa, nervis 9 lateralibus interioribus basin versus tenuissimis extimo magis conspicuo, margine ad medium dense barbato pilis subacutis, dorso glaberrimo. *Paleae* valvas subaequant, glabrae vel subglabrae. *Antherae* 0.6 mm. longae.

SOUTH AFRICA. Coast Region: Riversdale Div.; in moist places near Riversdale, 130 m., *Schlechter* 1759.

### XLIH.—PODOCARPUS THUNBERGII— NOMENCLATURE.

The following correspondence has passed between the Chief, Division of Botany, Department of Agriculture, Pretoria and the Director, Royal Botanic Gardens, Kew:—

SIR,

#### Botanical Nomenclature.

I have the honour to enclose with this some correspondence with the Research Officer of the Forestry Department of the Union of South Africa.

I should be glad if you would give a ruling in this matter. The changing of well-known and much used scientific names, especially in the case of economic plants, is always fraught with confusion and dissatisfaction in the lay mind, and I am personally in favour of keeping up the name *Podocarpus Thunbergii* if it is possible to do so. I have not, however, the literature at my disposal to enable me to decide the question of priority of nomenclature in this case and should be glad to have your opinion on the matter.

I am, etc.,

I. B. POLE EVANS,

*Chief, Division of Botany.*

SIR,

I have the honour to acknowledge receipt of your letter No. P. 44/6, dated 18th August last, on the subject of botanical nomenclature, and in reply to the specific question raised I take pleasure in enclosing a memorandum in which

the facts of the case are detailed. This may, I hope, enable you to come to a decision as to the course which it is desirable to adopt in the use of a name for the South African *Podocarpus* under reference.

I am, etc.,

D. PRAIN,  
Director.

### **Podocarpus Thunbergii (Nomenclature).**

The tree in question was originally called *Taxus latifolia* by Thunberg, Prod. Fl. Cap. (1794-1800) 117. R. Brown recognised it as a *Podocarpus* in 1825 (see Mirb. Geogr. Conif. in Mem. Mus. XIII. 75) and called it correctly *Podocarpus latifolia*, the name applying exclusively to a well-known South African tree. There is so far no ambiguity of the name. In 1830, however, Wallich described a totally different Indian tree as *Podocarpus latifolia*, evidently unaware of R. Brown having already formed the combination. In 1838 Bennet in Pl. Jav. rar. 40 repeated Brown's combination for the Cape tree; but he also admitted Wallich's identical name for the Indian Conifer on p. 94, quite aware of the contradiction, but probably unwilling to give the latter a new name. Then in 1842 W. Hooker (in Lond. Journ. Bot. i. 657) seeing the necessity of a new name for one of the two "*Podocarpus latifolia*" in Bennet's synopsis and assuming that R. Brown's combination was first made there, that is in 1838, whilst Wallich's dated from 1830, gave the latter priority and renamed the African species *P. Thunbergii*. That this is so is clear from his synonymy (*P. latifolia*, Br. in Horsf. Pl. Jav. Rar. 40, non Wall.) which contains no reference to R. Brown's earlier publication quoted above. There is little doubt that neither Wallich nor Sir W. Hooker would have named the plants in question as they did had they been aware of R. Brown's name of 1825. Two years later the mistake was pointed out by C. Presl (Bot. Bemerk. 110) who restored Brown's earlier name for the Cape tree and proposed the name *P. Wallichianum* for the Indian tree. R. Brown's and C. Presl's names seem to have remained unnoticed until their re-publication in Index Kewensis in 1894, by which time the names which supplanted them had become well established in literature, i.e., *P. Thunbergii* and *P. latifolia*, Wall. For that reason it might seem desirable to retain them, but there is no generally recognised rule under which this could be done, and to return to the earlier names will be the more expedient, as it is in agreement with the nomenclature of Pilger's recent monograph of *Taxaceae* in the Pflanzenreich.

I have treated "*Podocarpus*" as feminine in this memorandum, as has been done in Index Kewensis. Persoon, who first took up L'Heritier's MS. name, makes it masculine and Pilger follows him. It is a point of small consequence.

## XLIV.—MISCELLANEOUS NOTES.

GUSTAV MANN.—We have recently learnt with deep regret of the death, in his 81st year, of Mr. Gustav Mann, which occurred at Munich on June 22nd. As Collector for Kew on Dr. Baikié's Niger Expedition in 1859, he was the first to explore botanically the mountains of W. Tropical Africa, and in particular he made valuable collections on the Cameroon Mountain. In 1863 Mann was appointed assistant in the Government Cinchona plantations, Darjiling, and in the following year became assistant Conservator of Forests, Bengal. From November, 1868, he served in the Assam Forest Service, being appointed Conservator in 1882 and retired in May, 1891. In *K.B.* 1907, p. 247, a short account of Mr. Mann's work is given in connection with the presentation of his portrait to Kew.

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LORD REDESDALE.—In the death of Lord Redesdale, which occurred at Batsford Park, Moreton-in-Marsh, on 17th August, Kew has to mourn the loss of an old, a sympathetic and a tried friend. This is not the place in which to speak of the long and varied public career of His Lordship, which began in 1858 when in his 21st year he entered the Foreign Office, his diplomatic service ending with his resignation in August, 1873, though it may be remarked that to his residence in Japan from September, 1866, until the summer of 1870, may, perhaps, be traced the keen interest which he took in the introduction to this country and the establishment in English gardens of bamboos from temperate latitudes and altitudes in Eastern Asia.

In 1874 Lord Redesdale (then Mr. Freeman-Mitford) was appointed by Mr. Disraeli to be Secretary to the Commission of Public Works and Buildings, a position which he held until his resignation of the post in 1886. To this period, therefore, belongs his public connection with Kew, and the formation of that attached friendship with Sir Joseph Hooker, the Director of this establishment, to which His Lordship's recently published "*Memories*" bear such warm testimony.

Lord Redesdale's keen and cultured interest in gardening led from the outset to a marked official sympathy with Kew which developed in its intensity with longer association and fuller appreciation of the many-sided activities of the establishment itself. Nor did this interest leave with his demission of office. On the contrary it reacted on His Lordship and to the influence of his friend Hooker may be largely attributed the preparation of the work on "*The Bamboo Garden*," illustrated by Mr. Alfred Parsons and published in 1896, which, besides testifying to his enthusiasm and embodying his cultural experience in the cultivation of the more temperate *Bambuseae* in England, has placed systematic students of this difficult group under no little obligation for the lucidity of his accounts and the indications of the identity and the affinities of the various species he had succeeded in growing.

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***Albizzia ferruginea* and *A. malacophylla*.**—In 1844 Bentham\* described *Albizzia ferruginea* from two gatherings, one a flowering specimen from Gambia, collected by Leprieur, and described by Guilleman and Perrottet† as *Inga ferruginea*, the other collected in Abyssinia by Schimper and distributed under the name *Acacia malacophylla*, Steud. The latter was afterwards described by A. Richard‡ as *Inga malacophylla*, and subsequently became *Albizzia malacophylla*, Walpers. Bentham described the ovary of *A. ferruginea* as glabrous, evidently copying Guilleman and Perottet, for in Schimper's specimen the fruits are shortly and densely pubescent. In Bentham's later work§ on *Albizzia*, he added to the synonymy and remarked "the Senegambian plant being only known in flower and the Abyssinian one in fruit, their identity is perhaps not yet sufficiently established, although I can discover no character to separate them."

In 1894 Schweinfurth collected flowering specimens of the Abyssinian plant; whilst in 1912 Mr. C. C. Yates collected an example of the Senegambian species in Northern Nigeria with flowers and fruits which shows that Bentham's *A. ferruginea* includes two distinct species. Their differences and synonymy are as follows:—

***Albizzia ferruginea*, Benth.** in Hook. Journ. Bot. iii. 88 (1844), et in Trans. Linn. Soc. xxx. 563 (1875), partim, excl. syn. *Acacia malacophyllum*, Steud., et specimen *Schimperianum*; Oliv. Fl. Trop. Afr. ii. 361, partim; Chevalier, Veg. Ut. Afr. Trop. Fran. v. 170 (1909), partim. *Inga ferruginea*, Guill. & Perr. Fl. Seneg. i. 236 (1833).

Folia membranaceo-chartacea, apice rotundata vel paullo emarginata; pedunculi calycis et corollae indumentum ferrugineum; ovarium et fructus glaber.

**DISTRIB.**—Senegambia: River Nunez, *Heudelot* 881; Gambia: Albreda, *Leprieur*; Tamboukane, fr. Dec., *Chevalier* 2104. Ivory Coast: Bingerville, Feb., *Chevalier* 16218. Nigeria: Northern Provinces; Agaie, fls. & fr., Feb.–March, *Yates* 14; Southern Provinces; Awka Distr., *Thomas* 74.

Mr. Yates describes the tree as being 40–60 ft. high, occurring in fringing forests; wood very hard. Chevalier records it from Bingerville 80–100 ft. high with a trunk 14–18 in. in diameter, devoid of branches for nearly 50 ft., with an umbrella-like crown; the wood is similar to *Acacia* wood, clear yellow and finely striated. Vernacular—*Sakanchi* (Yates).

***Albizzia malacophylla*, Walp.** Ann. ii. 457 (1851–2); Fourn. in Ann. Sc. Nat. ser. IV. xiv. 376. *Inga malacophylla*, A. Rich. Fl. Abyss. i. 235, partim excl. *Schimper* 1578. *Acacia malacophylla*, Steud. ex A. Rich, l.c., nomen. *Albizzia ferruginea*, Benth. in Hook. Journ. Bot. 1844, 88, et in Trans. Linn. Soc. Bot. xxx. 563, partim; Oliv. Fl. Trop. Afr. ii. 361, partim.

Folia rigide chartacea vel subcoriacea, apice conspicue

\* Hook. Lond. Journ. iii. 88.

† Fl. Senegam. 236 (1833).

‡ Fl. Abyss. i. 235 (1847).

§ Revis. Mimosae in Trans. Linn. Soc. xxx. 563 (1875).



mucronata; pedunculi calycis et corollae indumentum cinereum; ovarium et fructus pubescens.

DISTRIB.—Abyssinia: mountain plains between Chiré and Sana, fr. Nov., *Schimper*, Sect. II. 521; Amba Lake, fr. March, *Schimper* 585. Eritrea: near Mai-Mafales, in Dembelas, 1700–1900 m., fl. Mar.–Apr., *Schweinfurth* 260; 261. Uganda: Mabira Forest, 1300 m., *Dawe* 175 (timber specimen no. 16).

Mr. Dawe states that this is a timber tree 70–80 ft. high, known as *Joge*. His specimen consists of leaves only, but I have little doubt as to the determination.

J. H.

**The genus *Phoradendron*.**\*—The genus *Phoradendron* in the New World takes the place of *Viscum* in the Old. Most species so resemble the common mistletoe as to be mistaken for it in a winter landscape; but beneath that great general resemblance is hidden a remarkable differentiation of minor characters often difficult for the inexperienced eye to grasp, but mostly going hand in hand with a definite and frequently narrow geographical distribution. On it is based the author's admission of a great number of species, 240 in all. The number may appear excessive, but the careful scrutiny which he has applied to his subject and the concordance of his work and the results obtained by the most careful students in the same field before him, as Eichler and Urban, impress one with confidence in the soundness of his limitation of the species. A passage from his introduction (p. 17) may be quoted as characteristic of the standpoint of the author in that respect:—"In a monographic assemblage, such as is here offered, no lasting harm can come from the most radical segregation of forms possible on morphologic and geographic considerations, while on the other hand a blending of widely dissociated forms or of such as differ greatly in their extremes though without as yet definable breaks in the series, e.g., *P. piperoides*, leaves the work to be taken up once more from the very foundation, and with reference to all of the original materials that may have survived."

The introduction (pp. 3–17) gives a short historical summary which implicitly settles the question of the validity of the generic name, an analysis of characters, brief notes on the parasitism, the hosts and enemies of *Phoradendron*, the origin of the genus—it is regarded as probably of late Tertiary origin in the New World to which it is confined—and the range of species, the area of the genus as a whole extending from Washington, Southern Colorado, the mouth of the Ohio and Southern New Jersey to the La Plata in the South. The text, including the description of new species, is in English. The figures cover 237, or nine-tenths of the recognised forms, a very unusual degree of completeness of illustration. They are all reproductions of photographs of natural size, and where possible from type specimens. They will be of great help, but they also

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\* The Genus *Phoradendron*. A Monographic Revision. By W. Trelease. Urbana, Ill. Published by the University. 1916. pp. 1–224, pl. 1–245.

emphasize the limitations of this process of illustration. Many of the figures are no better than outline reproductions with all detail lost or blurred. The indices of collectors and of occurrence are very full and should be very useful.

The genus is divided into two primary divisions, namely, Boreales and Aequatoriales, which, apart from their geographical areas, are characterised by the absence or presence respectively of cataphyllary scales. Each of these divisions is divided again into sub-divisions and some of them again into minor groups. All the sub-divisions and minor groups as well as the species are conveniently keyed. Under each species we find a complete account of the synonymy, a description, general indication of distribution, and a complete list of the specimens examined.

O. S.

**Lathyrus hirsutus.**—In the Gardeners' Chronicle of 30th September, pp. 156-7 (1916), Prof. B. T. P. Barker gives an account of a series of experiments carried out at the Research Station, Long Ashton, Bristol, with the object of obtaining new forms of Sweet Peas by hybridising the orange-scarlet "Kitty Clive" with *Lathyrus hirsutus*, Linn. In order to avoid possible confusion between *L. hirsutus*, Linn., and *Orobis hirsutus*, Linn., which has been cited in the Index Kewensis, vol. iii. 375, as a synonym, but which is a very different species, it seems desirable to give the synonymy of each with a short differential diagnosis. The error no doubt arose through the amalgamation of the two genera proposed by Grenier and Godron and adopted in the Genera Plantarum.

**Lathyrus hirsutus**, Linn. Sp. Pl. 732 (1753); Boiss. Fl. Or. ii. 609; Beck in Reichb. Ic. xxii. 168, t. mmcccliv. fig. v., vi., 12-15, Nyman Consp. 203. *L. hirtus*, Ten Fl. Nap. iv. in Syll. 302 (1830). *L. variegatus*, Host. Fl. Austr. ii. 327 (1831). *Lastila hirsuta*, Alef. in Bonplandia, ix. 147 (1861).—Leaf-stalks ending in a 3-forked curled tendril; leaflets linear or linear-lanceolate, scarcely 1 cm. broad; stipules linear, very acute, 1-2 mm. broad; seeds globose, with conspicuous wart-like wrinkles.

DISTRIB.—Europe, Asia Minor and North Africa.

**Lathyrus laxiflorus**, O. Kuntze in Act. Hort. Petrop. x. 185 (1887); Maly in Aschers. et Graebn. Synop. Mittel.-Europ. Fl. vi. ii. 1042. *Orobis hirsutus*, Linn. Sp. Pl. 728 (1753), non *Lathyrus hirsutus*, Linn., vide supra. *Orobis laxiflorus*, Desf. in Ann. Mus. Par. xii. 57, t. 8 (1808). *Lathyrus inermis* Rochel ex Friv. in Magyar Tud. Társ. Evkon. ii. 250, t. 2 (1835). *L. villosus*, Frivald. in Flora, xix. 437 (1836).—Leafstalks not ending in a tendril; leaflets elliptic or elliptic-lanceolate, with numerous parallel nerves; 1-2 cm. broad; stipules large and foliaceous, ovate, sagittate-auriculate at the base, about 2.5 cm. long and 1 cm. broad; seeds somewhat compressed, smooth.

DISTRIB.—Balkan States and Crete.

J. H.







J.H del

PENTZIA.

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